

Study of $\pi^+\pi^-$, K^+K^- , $p\bar{p}$ and $\pi^+\pi^+\pi^-\pi^-$ production in central exclusive processes with the STAR detector at RHIC

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This thesis is dedicated to the first measurement of the central exclusive production process in proton-proton collisions at RHIC with the STAR detector at $\sqrt{s} = 510$ GeV. At this energy, this process is dominated by a Double Pomeron Exchange mechanism.

Therefore, it is very promising for the search of gluon bound states, glueballs.

The experimental confirmation of their existence would be yet another strong support for the validity of the quantum chromodynamics theory.

The diffractively scattered protons, moving intact inside the RHIC beam pipe after the collision, were measured in the Roman Pots system allowing full control of the interaction's kinematics, and thus verification of the exclusivity. The preliminary results on the invariant mass distributions of centrally exclusively produced $\pi^+\pi^-$, K^+K^- and $p\bar{p}$ pairs measured within the STAR acceptance are presented in this thesis.

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